

**WE CLAIM:**

1        1. A system for managing a network comprising:  
2            a first network element;  
3            a second network element connected to said first network element;  
4            a network management system connected to said first and second network  
5        elements; and

6            wherein said first and second network elements each include means for  
7        encoding a unique identifier associated with each of said network elements, a  
8        processor coupled to said encoding means, and means for physical layer auto-  
9        discovery.

10        2. The system in accordance with claim 1 wherein said means for physical  
11        layer auto-discovery comprises:

12            a program storage device readable by a processor and tangibly embodying a  
13        program of instructions executable by the processor to perform a method of  
14        communicating connectivity information between said first and second network  
15        elements, the method comprising the steps:

16            sending a request packet at the physical layer from the first network element  
17        to the second network element; and

18            receiving a respond packet at the physical layer in response to said sent  
19        request packet.

20        3. The system in accordance with claim 2 wherein said request packet  
21        comprises a first packet protocol identifier, a sequence number, and a padding.

22        4. The system in accordance with claim 2 wherein said response packet  
23        comprises a second packet protocol identifier, said sequence number, a far end  
24        electronic serial number, a far end port identifier, and a padding.

4  
5  
1       5. The system of claim 1 wherein said first network element is connected to  
2       said second network element by an optical fiber link.

1       6. A method for automatically discovering a network topology comprising the  
2       steps of:

3               assigning an electronic serial number and unique port identifier to a network  
4       element;

5               representing the network element in a network management system based on  
6       said assigned electronic number;

7               communicating connectivity information between the network element and a  
8       neighboring network element based on said assigned electronic serial number and  
9       unique port identifier; and

10              communicating said connectivity information to the network management  
11       system so that the connectivity information is associated with said representation of  
12       the network element.

1       7. The method in accordance with claim 6 wherein said step of assigning an  
2       electronic serial number comprises the steps of assigning a network element model  
3       number and a network element serial number.

1       8. The method in accordance with claim 6 wherein said step of representing  
2       the network element in a network management system comprises the step of  
3       assigning a CORBA object to the network element and associating the CORBA  
4       object with said assigned electronic serial number.

1       9. A network element comprising means for encoding an electronic serial  
2       number associated with each the network element, a processor coupled to said

3 encoding means, and means for physical layer auto-discovery coupled to said  
4 processor and wherein said processor uses the encoded electronic serial number  
5 and the autodiscovery means to discover all other network elements linked to the  
6 network element.

10. A request packet for use in a physical layer auto-discovery protocol  
comprising a packet protocol identifier, a sequence number, and padding.

11. A response packet for use in a physical layer auto-discovery protocol  
comprising a packet protocol identifier, a sequence number, a far end electronic  
serial number, a far end port identifier, and padding.

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